

Poster Title:

Airborne In-Situ Measurements of Formaldehyde over California: First Results from the Compact Formaldehyde Fluorescence Experiment (COFFEE) Instrument

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Abstract:

Formaldehyde (HCHO) is one of the most abundant oxygenated volatile organic compounds (VOCs) in the atmosphere, playing a role in multiple atmospheric processes. Measurements of HCHO can be used to help quantify convective transport, the abundance of VOCs, and ozone production in urban environments. The Compact Formaldehyde Fluorescence Experiment (COFFEE) instrument uses Non-Resonant Laser Induced Fluorescence (NR-LIF) to detect trace concentrations of HCHO as part of the Alpha Jet Atmospheric eXperiment (AJAX) payload. Developed at NASA GSFC, COFFEE is a small, low maintenance instrument with a sensitivity of 100 pptv and a quick response time (1 sec). The COFFEE instrument has been customized to fit in an external wing pod on the Alpha Jet aircraft based at NASA ARC. The instrument can operate over a broad range of altitudes, from boundary layer to lower stratosphere, making it well suited for the Alpha Jet, which can access altitudes from the surface up to 40,000 ft. Results of the first COFFEE science flights performed over the California's Central Valley will be presented. Boundary layer measurements and vertical profiles in the tropospheric column will both be included. This region is of particular interest, due to its elevated levels of HCHO, revealed in satellite images, as well as its high ozone concentrations. In addition to HCHO, the AJAX payload includes measurements of atmospheric ozone, methane, and carbon dioxide. Formaldehyde is one of the few urban pollutants that can be measured from space. Plans to compare in-situ COFFEE data with satellite-based HCHO observations such as those from OMI (Aura) and OMPS (SuomiNPP) will also be presented.